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A Comparison of the Stock Market Reactions of Convertible Bond Offerings between Financial and Non-Financial institutions: Do they differ?

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Abstract

We focus on the stock price reaction to convertible bond offering made by financial institutions and find that the cumulative abnormal return over the three day interval around convertible bond issuance is 1.41 percentage higher than that for non-financial institutions. This result supports our hypothesis that since financials are heavily regulated, the market is less likely to assume that the issuance of convertible bond by financials signals information that are overvalued. Our results remain robust after controlling for a number of firm-, issue-, and market-specific characteristics as well as the level of short selling pressure induced by convertible bond arbitrageurs.

JEL classification: G21; G14; G18

Keywords: Convertible bond announcement effect, financials, regulation.

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1. Introduction

The 2007-09 global financial crisis has led to extensive regulations on financial institutions, as witnessed by for example, the passage of Dodd-Frank Act in 2010 in the U.S., and the Financial Services (Banking Reform) Act 2013 in the U.K. The economic regulation of banking is justified by the existence of market failure (Neal, 1997), which stems from the problem of information asymmetry and the risk of third party losses due to systematic instability (Thomson and Abbott, 2001). However, arguments suggesting as well as casting doubt on the net benefit of regulation are still in hot debate and the extant empirical evidence is largely mixed (for insightful reviews, see Healy and Palepu, 2001; Shleifer, 2005; Zingales, 2009).

Along with this debate is that any marginal benefits of financial institutions regulation may have been outweighed by other developments in the financial market. Among such developments there is deterioration in the level of trust between investors and financial institutions in response to the bankers' perceived greed and bad judgment during the 2007-09 financial crisis. This erosion of trust significantly impacted the financial institutions especially after the Lehman Brother's collapse.

Against this backdrop, we study how stock market would react to the announcement of convertible bond issuance in highly regulated financial industry compared to less regulated non-financial industries. Because convertible bond can be structured to mitigate several different combinations of debt- and equity-related costs of external finance, an empirical examination of average valuation effects for the full issuer universe is likely to be uninformative. Dann and Mikkelson (1984), Eckbo (1986) and Mikkelson and Partch (1986) document that investor reactions to the announcement of convertible bond offerings are negative on average, however, these studies ignore the heterogeneity between industries, and

in particular, they exclude financial institutions from their samples due to the special regulation status of financial institutions.

Our paper is also motivated by the suggestion made in Dutordoir et al.'s (2013) survey on convertible bond that "another limitation is that empirical studies tend to focus on convertibles issued by non-financial corporations. Financial firms are often excluded from research samples, as is common in corporate finance research. Financials account for a substantial portion of US hybrid securities issuance…It would be interesting to examine whether these firms' choice for convertible securities is merely driven by regulatory concerns…" This study intends to fill this gap and contribute to the literature by exploring the research question whether the share price reaction to convertible bond offerings made by financials is significantly different from that of non-financial firms. We hypothesize that the more stringent regulation faced by financial institutions have strengthened market's perception that, compare to their non-financial counterparts, the issuance of convertible bond by financials is less likely to signal information that their stock is overvalued, and hence the stock market reactions to the convertible bond issuance announcement is less negative for financials than non-financials.

We collect convertible bond issuance data between January 1982 and December 2013 and compare the share price reaction of convertible bond issuance for U.S. financials in comparison to counterpart U.S. non-financials. Our findings support our hypothesis that the cumulated abnormal return (CAR) for financials is less negative than the counterpart non-financials. The cumulative abnormal return over the three day period (-1,1) around the issuance for financials is -1.31 percent, that's 1.41 percentage points higher than non-financial firms and the difference is statistically significant at the 1 percent level. Our findings are robust after controlling for a number of firm-, issue- and market-specific

characteristics, as well as alternative estimation method.

The remainder of the paper is structured as follows: Section 2 reviews relevant literature, Section 3 describes the data and methodology, Section 4 discusses the empirical results, and Section 5 concludes.

2. Literature review

Since the recent 2007-2009 global financial crisis, convertible bonds have become increasingly popular for firms to raise capital. [2] Several theories suggest that convertible bond can mitigate a variety of debt- and equity-related costs of external finance, including asset substitution problems (Jensen and Meckling, 1976); financial distress and asymmetric information problems (Stein, 1992); risk uncertainty (Brennan and Schwartz, 1988); and overinvestment problem (Mayers, 1998). Hence, convertible bond might become an attractive middle ground between equity and debt. This is particularly true for financial institutions given that the whole financial industry faced serious financial constraints while at the same time being subject to stringent capital regulation during the crisis period. For example, during 2009 and 2010, Baylake Corp., a large U.S commercial bank, issued convertible notes five times with the total amount of $9.45 million.

Prior studies studying the share price reaction of a convertible bond offering generally focus on non-financial institutions. In the meta-analysis of wealth effects of convertible bond offerings by Abdul Rahim et al. (2012), most studies in their samples either eliminate financial institutions because they have different considerations when choosing capital structure compared to non-financial institutions or include financial institutions without

[2] It is shown for example in an article published on Financial Times on 10th March, 2011, titled 'Appetite for convertible bonds rises'.

differentiating them from the non-financials. Studies in general have found that non-financials experience significant negative abnormal stock returns (e.g., Abhyankar and Dunning, 1999; Ammann et al., 2006; Burlacu, 2000; De Jong et al., 2011; Duca et al., 2012; Murphy et al. 1997). The negative share price reaction has been commonly explained by theoretical models of asymmetric information as developed by Miller and Rock (1985) and of adverse selection as developed by Myers and Majluf (1984). According to these models, when a company issues risky securities, investors require a discount on share asymmetry between firm managers and investors.

Financial institutions, i.e., commercial banks, investment banks, brokers and insurance firms, among others, face stringent government regulation, which limit managers' ability to take advantage of the information asymmetry between the issuers and investors. Some financial firms may focus one activity (e.g., lending loans), but it is also common for financials to engage in a number of market activities such as securities market activities (e.g., brokering), insurance, and real estate activities. We argue that the existence of regulation may thus have significant impact on the market perceptions on the valuation of financials which issue convertible bonds. The disclosure requirement in general tends to mitigate opaqueness. [3] Government monitors financials to provide detailed financial information reported to public investors, and check the accuracy of the report. Formal enforcement actions for the publication of the financial report directed at individual financial institution have been

[3] Theory also suggests that financials may be more opaque than non-financials (Haggard and Howe, 2012; Iannotta, 2007; Morgan, 2002) and therefore may have higher information asymmetry than their non-financial counterparts. Financials' risks taken in the process of intermediation is difficult to observe from outsiders and therefore the inherent complexity of financials and the nature of the underlying assets make them opaque (Jones et al., 2012). Slovin et al. (1991) suggest that although there is a disclosure requirement, the characteristics of the information structure of financial operations limit the market's access to information needed to assess individual financial value and risk, which make financials more opaque. The recent 2008-09 financial crisis has witnessed severe dislocation in the interbank funding market (Flannery et al., 2012), which to some extent reflect uncertainty about counterparty solvency or financial opacity (Heider and Hoerova, 2009). However, the empirical evidence of financial opacity compared to that of non-financials is mixed and there is no consensus among researchers (Morgan 2002, Iannotta 2006, Flannery et al 2004).

publicly available since 1989. Investors should be able to receive more information on financial conditions and quickly impound this information into their stock and bond prices for an effective market discipline (Flannery et al., 2004). This disclosure requirement limits financial institution's incentive to take on excessive risks and improve the quality of information in the marketplace so that investors can make informed decisions (Mishkin and Eakins, 2012). The disclosure requirements may also induce better bank management, causing a positive relation between transparency and bank profit efficiency (Akhigbe et al., 2013). Since financials face more stringent regulation, they may be less able to take advantage of differential information between the issuers and investors, and hence the market is less likely to assume that the issuance of convertible bond by financials signals information that their stocks are overvalued. Hence, we hypothesise that convertible bond offerings by financials have less negative cumulative abnormal returns than those offered by non-financials.

Empirical evidence addressing the difference of stock price reactions upon convertible bond offerings among different industries is rather limited. To the authors' best knowledge, Janjigian (1987) and De Jong et al. (2012) are the only other two studies that report the share price reactions on convertible bond offerings in firms within alternative industries, including financial firms. However, neither study provides any explanation of the difference between financials and non-financials. Other studies compare the differences of stock market reactions upon convertible bond offerings among different industries find mixed results. For example Suchard (2007) finds that convertible bond issues by Australian industrial firms are associated with more negative abnormal return than resource firms (mineral and energy sectors), while Abdul Rahim et al. (2012) find no significant difference between industrial and non-industrial companies in their meta-analysis.

A number of studies have shown earlier that regulation impacts investor decisions. Chiyachantana et al. (2004) and Eleswarapu et al. (2004) report that with the introduction of the Regulation Fair Disclosure in October 2000, there has been an improvement on market liquidity and a decrease in information asymmetry. In particular they report that institutional trading before earnings announcement reduced significantly and retail investor participation increased after the announcement. Findlay and Mathew (2006) also show that the introduction of Regulation Fair Disclosure and its requirement for companies to publicly disseminate information has improved analysts' forecast accuracy. Grout and Zalewska (2006) report that regulation impacts market risk as proxied by the single-factor model and the Fama and French three-factor model. Polonchek et al. (1989) empirically support that due to stringent bank regulation, banks experience higher announcement returns of equity issues than counterpart non-financials.

An increasing number of regulations have been introduced to financial institutions in the U.S. that may have an impact on the market's perception on the valuation of convertible bonds by financials. In December 1991, the U.S. Congress passed Federal Deposit Insurance Corporation Improvement Act (FDICIA), with the prompt corrective action (PCA) provisions becoming effective in December 1992. PCA mandates progressive penalties against banks that exhibit progressively deteriorating capital ratios, which provides incentives for banks to address problems while they are still small enough to be manageable.[4] In 1992, the Accord of Capital Adequacy (Basel I) was enforced by law in the G-10 countries. Under the Accord, banks were required to hold a backing for weighted assets of no less than 8% total capital and at least 4% of tier 1, or core, capital. These capital requirements induce banks to take more

[4] Those banks fail to meet capital requirements are required by FDIC to submit a capital restoration plan. FDIC also restricts these banks' asset growth, and seeks regulatory approval to open new branches or develop new lines of business. Banks those are so undercapitalized as to have equity capital that amounts to less than 2% of assets will be closed down by FDIC (Mishkin and Eakins, 2012).

prudent portfolio or at least the investors perceive banks to do so (Rochet, 1992).[5] Banks are forced to have more of their own capital at risk so that they internalize the inefficiency of gambling (Hellmann et al., 2001).

In 1994, the Riegle-Neal Interstate Banking and Branching Efficiency Act further established the conditions for the removal of restrictions on interstate banking and branching in US. Under certain circumstances, banks are allowed to acquire banks or set up branches in other states without creating a separate subsidiary. Stiroh and Strahan (2003) argue that the passage of Riegle-Neal Interstate Banking and Branching Efficiency Act created a more competitive environment by allowing banks to enter new markets and threaten incumbent banks. The increased competition through a threat of entry encourages voluntary disclosure from the incumbent banks, particularly unfavourable information, since entry takes place only if the prospect is favourable (Darrough and Stoughton, 1990). Barakat and Hussainey (2013) also suggest that increased competition could lead to increased incentives for bank to enhance the quality of risk disclosures in order to get better access to external finance and supports its reputation from the perspectives of customers and potential investors.

The recent adoption of Basel II and III by the Federal Banking agency and the passage of Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010 introduced more stringent regulation on capital adequacy and information disclosure, as well as consumer protection, which may lead to decreased level of adverse selection costs for financial institutions' security sales. Pasiouras et al. (2009) report that the introduction of Basel II increased both cost and profit efficiency of banks from 113 countries. Hoque (2013) find that banks in countries with higher restrictions on higher tier 1 capital are less risky.

[5] The U.S. implementation of Basel II has been much slower than the implementation of Basel I. The federal banking agencies did not adopt a final regulation applying Basel II to banks in the U.S. until late 2007, and the regulation did not become effective until 1 April 2008.

In the wake of the crisis, the "shadow-banking system" or non-banks have also received a great deal of attention and a subsequent regulation response. The Financial Stability Board issued three documents for consultation in November 2012, which includes an integrated overview of policy recommendations, a policy framework for oversight and regulation of shadow-banking entities, and a policy framework addressing risks in securities lending and repos. The principle proposal recommends central clearing of repos, curbs on rehypothecation, more stringent collateral valuation, and better liquidity management (White, 2013).

The principal regulation changes of the insurance industry in recent years has been the implementation of the Insurance Core Principles (ICP) promulgated by the International Assocation of Insurance Supervisors (IAIS) in 2011, where 26 principles are laid out to ensure the insurance sector is financially sound and that there is an adequate level of policyholder protection.[6] The Federal Stability Oversight Council (FSOC) in the U.S. has also identified three systemically risky non-bank companies: AIG, General Electric Capital Corporation, and Prudential Financial, which are subjected to the supervision by the Board of Governors of the Federal Reserve System and to enhanced prudential standards.[7]

Overall, the above mentioned regulation changes have strengthened market's perception that, compare to their non-financial counterparts, the issuance of convertible bond by financials is less likely to signal information that their stock is overvalued. The regulation changes mentioned above is a subset of changes that have taken place for financials over the previous three decades and the introduction of regulations may overlap. For these reasons, we do not isolate particular regulation changes to test the difference on stock market reactions

[6] International Association of Insurance Supervisors, "Insurance and Financial Stability", November 2011.

[7] Financial Services, KPMG, "Evolving Insurnace Regulation", March 2014.

upon convertible bond announcement between financials and non-financials, but rather compare financials and non-financials over the full sample period.

3. Data and methodology

We obtain data of U.S. convertible bond issuances between January 1982 and December 2013 from the Securities Data Company's (SDC) *Global New Issues* database. Data are restricted after 1982 in line with SDC's coverage. Consistent with other studies (e.g., Duca et al., 2012), we only include plain vanilla convertible bonds and multiple issues of convertible bonds by the same firm, on the same date, are consolidated. We compare issuances between financials (SIC codes 6000-6999) and non-financials. The dataset consists of 2,567 convertible issues out of which 317 are by financials and the remaining 2,250 by non-financials. Share price and financial data are collected from DataStream.

We follow a conventional event study analysis to estimate the share price reaction on convertible bond offerings. We use the market model to estimate excess returns. The period between -250 and -10 days before the announcement date (day 0) is used to estimate the parameters of the model and S&P 500 proxies the market. We estimate the cumulative excess returns on the day interval period between -1 and +1 to estimate the cumulative abnormal return (CAR) on convertible bond offerings. The incorporation of a day before to a day after the announcement is commonly used to measure announcement returns since rumors may be available before the announcement and there may be a lag to respond due to late of the day dissemination of information.

Appendix I provides the detailed definition of the variables used in the study. All firm- and macroeconomics-specific characteristics included in the regression analysis are measured

at the fiscal year-end preceding the convertible bond announcement date. We control for the following firm-, issue- and market-characteristics:

Ln(Total assets) is the natural logarithm of total assets as a proxy of firm size. Studies (e.g., Abhyankar and Dunning, 1999) suggest that larger firms are likely to have a lower level of information asymmetry, since larger firms are more likely to have greater analyst coverage and to undergo greater scrutiny by institutional investors. However Lewis et al. (2003) suggest that smaller firms face higher equity-related financing costs and the security issue follows a substantial increase in firm's stock price, indicating that small firms may benefit more from convertible bond issues. Hence, we do not have a clear expectation for the relation between firm size and stock abnormal return.

Proceeds is the relative size of the convertible bond offering divided by total assets. Dutordoir and Van de Gucht (2007) suggest that larger size offerings may induce higher external financing costs and a more negative offering impact on abnormal return. Mikkelson and Partch (1986), Jen et al. (1997) and Lewis et al. (1999) also provide empirical evidence that the issue size is negatively related to stock abnormal return. We therefore expect a negative relation between proceeds and stock abnormal return.

Equity/Total assets is a measure of a firm's equity level. Firms with lower equity level are considered more risky and face higher costs of potential financial distress. Stein (1992) suggests that firms may issue convertible securities as an indirect method to increase the equity in their capital structures thereby reducing the adverse selection costs associated with pure equity issues. Firms with lower equity level should therefore benefit more from convertible issues. We hence expect a negative relation between the abnormal returns and equity level.

Maturity captures the time between the issue date and the date on which the issue is allowed be converted to the shares of common stock in the issuing company or cash of equal value, at the agreed-upon price. Studies (e.g., Easterbrook, 1984; Datta et al., 2000) suggest that firms with better performance have incentive to issue convertible bond with longer maturity to postpone the conversion. We therefore expect a positive relation between maturity and abnormal returns

Stock run-up is used to proxy the level of equity-related financing costs faced by the convertible bond issuers and measured as the continuously-compounded non-market-adjusted daily stock return over trading days between -60 and -2. Dutordoir and Van de Gucht (2007) suggest that a firm with high stock run-up is more likely to be seen as overvalued by stockholders. Lewis et al. (2003) also find that firms with high pre-issue stock run-up and high-risk firms are more likely to issue equity-like convertibles to reduce equity-related financing costs. We therefore expect that the relation between pre-issue stock run-up and abnormal return associated with convertible bonds offering is negative.

Stock volatility is the annualized stock return volatility measuring firm's riskiness calculated from daily returns over the day interval from -250 to -10 relative to the convertible bond issue date. Since firms with high operational risk are expected to have a large expected cost of financial distress (Chang et al., 2004), we expect that a firm's volatility is negatively related to abnormal return associated with convertible bond offerings.

Rule 144A is a dummy variable to control for the effect of the Rule 144A private placement of convertible bonds. It equals to one for convertible bond issued in 144A market and zero otherwise. Rule 144A is issued in 1990 to improve the liquidity and efficiency of private placement market by giving more freedom to institutional investors to trade securities. Securities under Rule 144A do not require registration with SEC, but can be traded without

restriction in the secondary market among qualified institutional buyers (Brown et al., 2012). Livingston and Zhou (2002) suggest that investors in 144A market have lower liquidity, information uncertainty, and weaker legal protection. We therefore expect that convertible bond issued in 144A market has a negative relation with the share price reaction on the issuance.

Market run-up is a measure of overall market and economic condition and is measured as the continuously-compounded non-market-adjusted daily market index (S&P 500) return over trading days between -60 and -2. We would expect that issuers tend to issue convertible bond after a significant accumulation of market index return in addition to stock return. However, Lewis et al. (2003) and Duca et al. (2012) find no significant influence of market run-up on convertible bond abnormal return in the U.S. market.

Market volatility is the annualized market stock return volatility, or the market risk, which is calculated from daily returns on the S&P 500 index. Volatile stock market indicates macroeconomic deterioration, which may have negative impact on convertible bond abnormal return. In addition, studies (e.g., Duca et al., 2012) suggest that there is a strong positive correlation between market volatility and information asymmetry and we therefore expect that the market volatility is negatively related with returns on the announcement of convertible bond.

4. Empirical analysis

4.1 Univariate analysis

Table 1 compares the key variables used in the study for financials and non-financials. In line with Dutordoir and Van De Gucht (2004), Panel A of Table 1 shows that convertible bond

offerings for non-financials have significantly negative CAR at -2.72 percent in the day interval between -1 and +1. In line with our hypothesis, we find that the CAR for financials is -1.31 percent. The difference between financials and non-financials is 1.41 percent, which is both statistically and economically significant

We further show the statistics of the control variables. Among the most interesting relations, we find that financials have significant larger size than non-financials, with the logarithm of total assets being 6.79 and 1.92, respectively. This is not surprising given that financials tend to be large organizations. The proceeds to assets ratio by financials, is also significantly lower than that of non-financials, with being 0.01% and 0.04%, respectively. The lower level of proceeds ratio may to some extent reflect the significant larger size for financials. We also observe significant lower equity/assets ratio by financials, which is around 26% compare to more than 45% for non-financials.[8] We further notice that the stock run-up for financials (9.91%) is significantly lower than that of non-financials (18.48%). Financials seem to face less financial constraints than their non-financial counterparts hence financials may tend to issue convertible bond when they need it, while managers of non-financials seem to consider the timing of the issuance when their stocks are overvalued. In summary, the sample banks have significantly lower proceeds/total assets ratio, equity level, and stock run-up, but larger total assets than their non-financial counterparts.

Panel B of Table 1 further shows the number of convertible bond announcements for financials and non-financials. There are announcements for both groups for all years, with a tendency the number of observation to increase after 2000. Table 2 further shows the Pearson correlations among our independent variables. For example, financials tend to have large total

[8] Please note that the leverage ratio is based on firm's market value.

assets, with a lower stock run-up and stock volatility. There are relatively weak correlations among control variables, indicating minimum risk of multicollinearity problem.

Figure 1 further depicts annual abnormal returns for financials and non-financials separately. We find that financials tend to experience higher abnormal returns over the duration of the sample period with only a few exceptions. The trend analysis shows that this difference is not driven by any particular time period, for example, the early 2000s dot.com bubble, and the 2007-09 global financial crisis, etc.

4.2 Multivariate analysis

In this section, we explore whether the less negative share price reaction on financial convertible bond offerings than non-financials can be explained by the firm-, market- and issue-specific characteristics. CAR over the day interval between -1 and +1 is used as the dependent variable. Table 3 shows the results of Ordinary Least Squares with White-corrected standard errors. Column (1) includes the financial dummy variable with key control variables. Year dummies controlling for technology changes have been included in these regressions but not reported to save space.

We find that the financial dummy is significantly positive, showing that financials have higher abnormal stock returns than non-financials upon convertible bond offerings. Specifically, the CAR on financials is 1.452 percent higher than non-financials as is shown in column (1) and this difference is significant at the 1 percent level. This empirical finding supports our hypothesis that less negative stock abnormal return upon convertible bond offerings should be found for financials compare to non-financial firms.

Regarding the control variables, signs and significant levels are to a large extent in line with our expectations. For example, larger firms in size tend to have negative impact on the abnormal stock return upon convertible bond offerings. Larger firm face lower equity-related financing costs and the security issue follows a substantial decrease in firm's stock price, therefore they may benefit less than smaller firms from convertible bond issues. One percentage of increase in firm total assets is associated with 0.00185 (0.01*0.185) percentage[9] decreases in CAR. In other words, holding other factors constant, a firm with twice as bigger in size as the other firm will have on average 0.185 percentages lower in CAR. In line with Lewis et al (2003), the stock price reacts also negatively to the convertible bond issuance by firms with higher stock run-ups, since these firms are more likely to be seen as overvalued by stockholders. Managers of non-financials seem therefore to time the issue of convertible bond when their firms' stocks are significantly overvalued. We find one percentage of absolute increase in stock run-ups may lead to 0.014 percentage decrease in CAR. We also find that issues with longer maturity have better stock price reaction, because firms with better performance have incentive to issue convertible bond with longer maturity to postpone the conversion. An additional year in maturity will increase CAR by 0.02 percentages. In line with Livingston and Zhou (2002), we find that issuers of convertible bonds under Rule 144A experience a negative stock reaction of the offering because investors in 144A market have lower liquidity, information uncertainty, and weaker legal protection. On average the CARs for convertible bond issued under Rule 144A is 0.717 percentages lower than those non-Rule 144A counterparts. Overall, the result from the univariate analysis holds even after adjusting for firm-, market- and issue- characteristics.

[9] Please note that all the discussion of control variables are based on column 1 in Table 3.

4.3 Controlling for additional variables

We incorporate a series of robustness tests to check the validity of our prior findings. Recent research suggests that hedge fund arbitrage has negative impact on convertible bond offerings abnormal return (Arshanapalli et al., 2005; Duca et al., 2012; Loncarski et al., 2009; De Jong et al., 2011). To exploit under-priced convertible bond issues, convertible arbitrageurs buy convertible bond and short sell the underlying common stock. The short selling creates downward pressure on the stock price of the convertible bond issuer. While on the other hand, DeLong et al. (1990) argue that opacity limits informed arbitrage, the absence of which creates space for noise trading. If financials are more opaque than non-financial firms, arbitrageurs may have to bear a greater risk when hedging the security issued by them. To the extent that arbitrageurs are risk averse, the high risk and potential ruin from the accumulation of short-term losses reduce their willingness to hedge the convertible bond issued by financials (Jones et al., 2012). We therefore include a measure "Arbitrage" for the amount of arbitrage-related short selling associated with each convertible bond offering in the second specification in Table 3. We follow the method used by Duca et al. (2012) for the construction of "arbitrage" and assume that convertible bond arbitrageurs follow delta-neutral hedging strategy. "Arbitrage" is measured as the estimated portion of change (increase) in short interest around convertible bond offerings that may be attributable to the short-selling actions of fundamental traders. Specifically, we run a regression with the scaled change in monthly short interest by the number of shares outstanding as the dependent variable, and a group of determinants[10] of convertible arbitrageurs' interest, then the predicted value of this regression is the measure for the change in short interest caused by arbitrage-related short selling for that convertible bond. We find that in line with Duca et al. (2012), the hedge fund

[10] We use the logarithm of total assets, the proceeds ratio, stock volatility, and dividend pay-outs as the determinants of convertible arbitrageurs' interest.

involvement in convertible bond offerings generates downward price pressure, and one relative percentage (or 0.0001 unit) increase in arbitrage is associated with 0.006 percentages decrease in CAR. However, financials issued convertible bonds still have higher abnormal return (2.245 percent) than non-financials after controlling for arbitrage. [11]

In the third specification in Table 3, we consider whether financial issued convertible bond have higher abnormal return because it is more "equity-like". We hence control for conversion premium, the ratio between conversion price and stock price at the issue date. Convertible bond with lower conversion premium is more equity-like, since the probability of conversion should be higher (Loncarski et al., 2008). Jen et al. (1997) use the conversion premium to measure how much of the convertible's value lies initially in its equity or option component and find that the stock market responds less favourably to those convertible issues that are more equity-like. We find that conversion premium has a positive relation on the abnormal return associated with the convertible bond issues. One unit (or 3.7%) increase in conversion premium is associated with 0.01 percentages increase in CAR. Our main results of higher stock abnormal return upon convertible bond offerings by financials than non-financials still hold, showing financials have higher abnormal returns by 1.320 percent after adjusting for conversion premium.

In the fourth specification in Table 3, we include the market-to-book ratio as a measure of growth opportunities/profitability of future investment decisions. De Jong and Veld (2001) argue that the asset substitution and adverse section problem could be reduced by the expectations in the market about the profitability of the company's project. However, Lewis et al. (2003) suggest that firms with high market-to-book ratio face high financial distress

[11] The number of observations varies from specification 2 to 6 due to the restriction of data availability of the additional variables used.

costs, and are also likely to face significant asymmetric information problems, especially regarding the profitability of their future investment opportunities. Our main results hold after controlling for market-to-book ratio, and one percentage absolute increase in market-to-book ratio will increase CAR by 0.003 percentages.

In the fifth specification in Table 3, we include a dummy variable primary capital expenditure, which equals to one if the primary intended use the proceeds is for capital expenditure, and zero otherwise. McConnel and Muscarella (1985) argue that if managers follow the market value maximization rule, an announcement of an unexpected increase in capital expenditures should have a positive impact on the market value of the firm and vice versa. The positive revaluation associated with unexpected capital expenditure increases because the market immediately capitalizes the incremental positive NPV associated with the unexpected projects to be undertaken by the firm. We find that our main results hold with financials having 1.463 percent higher abnormal returns after controlling for capital expenditure, though we do not find that the use of proceeds has a significant relation with convertible bond offering effect.

The sixth specification in Table 3 explores whether the higher announcement returns for financials is driven by the 2007-09 financial crisis period. We add a crisis dummy, based on year 2007 to 2009, and interact the crisis dummy with financial dummy. We find that the financial dummy remains similar at a magnitude after such control. We also find that the announcement return upon convertible bond offerings during the 2007-09 financial crisis is significantly lower than the period outside the crisis. However, the interaction between crisis and financial dummies is insignificant, indicating that the difference between the abnormal returns of financials and non-financials during the crisis is indifferent from other periods.

Finally, the seventh specification explores whether our results may hold when estimating abnormal announcement returns within the alternative (0, 1) event window [12]. Once again the financial dummy variable remains significantly positive, showing that our results are robust by using different event windows. The higher abnormal returns for financials are 1.047 percent in comparison to counterpart non-financials. [13]

4.4 Differences in CARs across different industries

We undertake further robustness tests in relation to the differences in the CARs upon convertible bond offerings across industries. In Table 4 we explore whether financials experience less negative announcement returns in relation to individual industries across non-financials: manufacturing, wholesale retail, services, transportation, telecommunication, construction, mining and utilities. We use eight industry classifications, a rather wide definition, to have reasonable amount of observations available per industry. [14] In specification 1 where the default industry is financials, we find that the parameter coefficients across other industries are negative, and mostly statistical significant. These results offer further credence that financials experience less negative announcement returns on convertible bonds announcements in comparison to counterpart non-financials. We observe, however, that the differences in CARs between utility and telecommunications industries and financials are statistically insignificant. According to Smith (1986), utility firms generally report smaller (or less negative) observed stock price reaction to announcement of new security

[12] Literature on the announcement effects of convertible bond uses (0,1) event window includes Abhyankar and Dunning (1999), Suchard (2007), and Ammann et al. (2006), among others.

[13] In unreported results, we have undertaken further robustness for example, when using alternative estimation window from -200 to -40 days, and event window (-1,0). Results remain qualitatively similar.

[14] We exclude those industries with less than 15 observations across the whole sample period.

sales compare to other non-financial industries because of its higher frequency of use of external capital markets and the magnitude of the stock price change at the announcement will vary inversely with the degree of predictability of the announcement if other factors are held constant. Telecommunications industry has traditionally been subject to a complex federal and state regulation in the U.S., since telecommunications services are based on an increasingly sophisticated and complex network of services that differ in distance, quality, amount and nature of data, etc. (Economides, 2005), and the regulation is even strengthened after the Telecommunications Act of 1996.

In the second specification, we further explore whether commercial banks has higher convertible bond announcement returns compared to non-banks and non-financials. Commercial banks are monitored by both the market and the regulator and are constrained in terms of the timing and choice of financing (Poloncheck et al., 1989). The security issuance process by banks is also frequently mandated by bank regulators. Through chartering, proposals for new banks are screened to prevent undesirable people from controlling banks, therefore reduce the adverse selection problem. Regulation also limits the freedom and flexibility of bank managers to set the quantity of capital, to choose the type of capital, and to time security offerings to take advantage of differential information between the managers and the public (Poloncheck et al., 1989). The second estimation indeed supports empirically our hypothesis showing that banks experience higher announcement returns from counterpart non-banks and non-financials.

Finally, in the third specification, we drop commercial bank issued convertible bond offerings from our sample and re-run the regression of specification 1. The purpose of this specification is to compare all the other non-financial industries with the default non-banks to investigate whether our previous results are driven by the commercial banking industry. We

find that similar to specification 1, most non-financial industries have more negative announcement abnormal returns upon convertible bond offerings compare to the non-banks.

4.5 Matched sample methodology

We also concern the robustness of the methodology we used so far. One may argue that our sample between financials and non-financials are not balanced (317 vs. 2,250), and this imbalance may cause bias in our results. Following Flannery et al. (2012), we compare the CARs of financial issued and non-financial firms issued convertible bonds by matching each sample financials with a controlled non-financial firm on the basis of important characteristics as a robustness test. We select the firm whose size, relative size of proceeds, and conversion premium is closest to the financial as our non-financial control firm. These matches are nevertheless imperfect, so we control for these differences in the regression.

$$\Delta CAR_i = \delta_0 + \delta_1 \left(\Delta \frac{Equity}{Totalasset_i}\right) + \delta_2 (\Delta\, stock\ runup_i) + \delta_3 (\Delta\, stock\ volatility_i) + \delta_4 (\Delta\, market\ volatility_i) + \delta_5 (\Delta\, market\ runup_i) + \delta_6 (\Delta\, maturity_i) + \mu_i \quad (1)$$

Where ΔCAR_i denotes the i^{th} bank's CAR less that of its control firms estimated into a number of bank characteristics.

The estimated value of δ_0 thus measures the mean excess CAR of financial issued convertible bond over its control firm, after controlling for differences in firm-, issue- and market- specific variable between financial and control. The regression results are reported in Table 5. We find that our results are robust with this alternative methodology, showing that financial issued convertible bond has higher abnormal return than non-financials, since after controlling for the differences in various characteristics, the constant term (δ_0) is still

significantly positive. In particular, the constant term shows that financials have higher abnormal returns by 1.138 percent than non-financials.

5. Conclusions

Previous literature focused on non-financials and generally found significantly negative stock price effects associated with convertible bond offerings. We focus on the difference in the stock market reactions to the convertible bond offerings by financials and non-financials. Because of the existence of the stringent regulation, financials are less able to take advantage of differential information between the managers and the public, and hence the market is less likely to assume that the issuance of convertible bond by financials signals information that is overvalued. We therefore hypothesize less negative share price reaction for financials that issue convertible bond than that of non-financial counterparts. Indeed, we find that the cumulative difference on abnormal return associated with convertible bond offerings for financials is 1.42 percent higher than the counterpart non-financials.

The results of our study therefore offer further evidence of the impact of regulation on investor decision within the convertible bond literature. A number of studies (e.g., Eleswarapu et al., 2004; Findlay and Mathew, 2006; Polonchek et al., 1989) have previously shown that regulation impacts stock market characteristics such as liquidity and analysts' forecast accuracy. Our study offers further confirmation that regulation impacts positively on the stock market reaction to convertible bond announcements. Financials that are highly regulated experience higher stock announcement returns compared to counterpart non-financials due to lower level of information asymmetry.

We focus on convertible bond announcement in the U.S. market due to its market's

significance and the relatively large dataset available for financials. We believe that our results are potentially applicable to an international context. In line with US findings, a number of studies have shown that convertible bond announcement returns for non-financials are significantly negative for the UK (Abhyankar and Dunning, 1999), and other European countries (e.g., Dutordoir and Van de Gucht, 2009). Financials also tend to face stringent regulations globally (Barth et al., 2001). Regulations such as Basel I, II and III are applicable to financials over a large number of countries and there have been recent introductions and further discussions of stringent regulation since the recent financial crisis of 2007-2009 (Mullineux, 2013). For example, the creation of a Banking Union is under discussion across countries of European Union. The limitation of our single country analysis, however, is that it is difficult to quantitatively measure the financial regulation changes over time, and is hence unable to quantify the impact of the regulation changes on the convertible bond announcement effect. Future research may therefore be needed to explore the validity of our empirical results for financials using cross-country data.

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Table 1. Summary statistics

Panel A: Overall statistics

	Financial firms			Non-financial firms			
	(1)	(2)	(3)	(4)	(5)	(6)	(2)vs(5)
Variable	Obs	Mean	Median	Obs	Mean	Median	
CAR	317	-1.31	-1.09	2250	-2.72	-2.6	1.41***
Total assets	317	6.79	1.94	2250	1.92	0.36	4.87***
Proceeds	317	0.01	0.01	2250	0.04	0.02	-0.03***
Equity/Total assets	317	26.15	20.24	2250	44.75	45.75	-18.60***
Maturity	317	17.95	15.22	2250	15.82	7.15	2.13*
Stock run-up	317	9.91	7.65	2250	18.48	13.19	-8.57***
Market run-up	317	44.41	32.21	2250	67.86	52.51	-23.45
Stock volatility	317	16.45	13.17	2250	16.96	14.41	-0.51***
Market volatility	317	4.62	4.93	2250	4.21	4.74	0.41
Arbitrage	77	0.01	0.01	789	0.01	0.01	0***
Conversion premium	261	27.08	24.00	1701	30.65	25	-3.57*
Market-to-book	299	1.05	1.30	2142	3.41	1.95	-2.36

Panel B: Number of observations (Yearly)

Financial firms				Non-financial firms			
1982	4	1998	5	1982	22	1998	47
1983	7	1999	4	1983	27	1999	34
1984	8	2000	3	1984	17	2000	93
1985	13	2001	10	1985	54	2001	158
1986	12	2002	10	1986	68	2002	94
1987	7	2003	14	1987	70	2003	211
1988	4	2004	20	1988	24	2004	143
1989	2	2005	15	1989	22	2005	89
1990	1	2006	16	1990	20	2006	111
1991	4	2007	24	1991	33	2007	117
1992	6	2008	14	1992	47	2008	65
1993	12	2009	25	1993	41	2009	85
1994	1	2010	18	1994	15	2010	49
1995	4	2011	4	1995	27	2011	55
1996	13	2012	13	1996	85	2012	106
1997	13	2013	11	1997	114	2013	107

Panel A of this table provides the summary statistics and t-test for the cumulative abnormal return (CAR) and firm-specific, issue-specific and macroeconomic variables of financial and non-financial firms over the sample period January 1982 to December 2013. Variables are defined as outlined in Appendix 1. CAR is calculated using standard event study methodology. We use student t-test to examine the differences the mean value of CAR and each firm-, issue-, and market-specific characteristic between financial and non-financial firms. Obs denotes the number of observations. * significance of the t-test statistic at 10% level.** significance of the t-test statistic at 5% level.*** significance of the t-test statistic at 1% level. Panel B of this table reports the number of observations for both financial and non-financial institutions each year across the sample period.

Table 2. Correlation matrix

	Financial	lnTA	Proceeds	Equity/Total assets	Maturity	Stock run-up	Stock volatility	Rule144a	Market volatility	Market run-up	Arbitrage	Conversion premium	Market-to-book	Primary capital expenditure
Financial	1													
lnTA	0.3199*	1												
Proceeds	-0.0420*	-0.1783*	1											
Equit/Total assets	-0.2856*	-0.1290*	0.0330*	1										
Maturity	0.0609*	-0.0523*	-0.0206	-0.0641*	1									
Stock run-up	-0.0693*	-0.1572*	-0.0025	-0.0265	-0.0319	1								
Stock volatility	-0.1438*	-0.4552*	0.0465*	-0.0821*	-0.0053	0.3665*	1							
Rule144a	-0.0806*	0.2579*	-0.0124	0.1629*	-0.1508*	0.0492*	-0.1508*	1						
Market volatility	-0.0283	-0.0073	-0.0175	-0.0299	0.0009	0.1601*	0.3752*	-0.0046	1					
Market run-up	-0.0206	0.0387*	-0.015	-0.0042	-0.1122*	0.2526*	-0.031	0.0355*	0.0577*	1				
Arbitrage	0.0937*	0.2369*	-0.0992*	-0.0378	0.0413	-0.4385*	-0.7150*	0.0372	-0.3225*	-0.0103	1			
Conversion premium	-0.0464*	-0.0339	-0.0119	0.007	-0.0474*	0.0056	0.0475*	0.0440*	0.0158	-0.0593*	0.0076	1		
Market-to-book	-0.0068	0.0207	-0.0154	0.0325	-0.006	-0.0042	-0.002	0.0324	-0.0006	-0.0071	-0.0892*	-0.0038	1	
Primary capital expenditure	-0.0136	-0.0333*	-0.0056	-0.0215	-0.0163	-0.005	0.0295	-0.0293	0.02	-0.0028	-0.0281	0.0492*	-0.002	1

This table provides the correlations among our variables for the full sample used in this study. Variables are defined as outlined in Appendix 1. * significance of the t-test statistic at 10% level.

Table 3. Regression analysis of convertible bond abnormal returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Financial	1.452***	2.245**	1.320***	1.436***	1.463***	1.163***	1.047***
	(4.203)	(2.438)	(3.437)	(3.967)	(4.224)	(3.282)	(3.463)
lnTA	-0.185**	-0.117	-0.047	-0.192**	-0.179**	-0.191**	-0.187***
	(-2.298)	(-0.645)	(-0.451)	(-2.126)	(-2.205)	(-2.365)	(-2.931)
Proceeds	-1.313	-2.634	3.511	-1.875	-1.292	-1.320	-1.429**
	(-1.416)	(-0.274)	(0.999)	(-0.824)	(-1.386)	(-1.427)	(-2.451)
Equity/Total assets	-0.007	-0.004	-0.011	-0.009	-0.007	-0.007	-0.006
	(-1.167)	(-0.286)	(-1.510)	(-1.507)	(-1.124)	(-1.161)	(-1.261)
Maturity	0.020**	0.025*	0.014	0.019**	0.020**	0.020**	0.015**
	(2.532)	(1.696)	(1.039)	(2.255)	(2.526)	(2.498)	(2.186)
Stock run-up	-0.014***	-0.012	-0.016***	-0.014***	-0.013***	-0.013***	-0.013***
	(-2.824)	(-0.962)	(-3.039)	(-2.872)	(-2.799)	(-2.729)	(-3.765)
Stock volatility	0.006	-0.002	-0.003	0.007	0.006	0.006	0.003
	(1.309)	(-0.189)	(-0.528)	(1.375)	(1.343)	(1.243)	(0.644)
Rule144a	-0.717**	-1.193**	-0.536	-0.809**	-0.716**	-0.721**	-0.655**
	(-2.259)	(-1.977)	(-1.407)	(-2.496)	(-2.246)	(-2.271)	(-2.430)
Market volatility	0.024	-0.076	0.008	0.018	0.021	0.032	-0.019
	(0.447)	(-0.706)	(0.130)	(0.329)	(0.392)	(0.609)	(-0.420)
Market run-up	0.058**	0.125**	0.046	0.058**	0.058**	0.057**	0.062***
	(2.192)	(2.274)	(1.553)	(2.142)	(2.178)	(2.156)	(2.717)
Arbitrage		-61.551*					
		(-1.928)					
Conversion premium			0.010*				
			(1.708)				
Market-to-book				0.003*			
				(1.692)			
Primary capital expenditure					2.648		
					(1.317)		
Crisis						-4.048**	
						(-2.181)	
Financial*crisis						1.600	
						(1.578)	
Constant	0.524	1.135	-0.341	0.842	0.458	0.539	
	(0.346)	(0.201)	(-0.180)	(0.509)	(0.300)	(0.357)	
N	2567	764	1962	2441	2555	2567	
adj. R-sq	0.050	0.035	0.053	0.053	0.050	0.050	

This table presents the results of the regression analysis of the cumulative abnormal stock returns upon convertible bond offerings on a number of potential determinants. The dependent variable is the cumulative abnormal return measured over the window (-1, 1) relative to the announcement date, except in column (7) where the event window is (0, 1). All explanatory variables are defined in Appendix 1. The focus is on the 'financial' dummy that shows wealth effect for financials compare to non-financials. N denotes the number of observations. *, **, and *** represent significance levels of 10%, 5% and 1%, respectively.

Table 4. Industry estimations

	(1)	(2)	(3)
Financial			
lnTA	-0.137	-0.142	-0.169*
	(-1.410)	(-1.451)	(-1.681)
Proceeds	-1.080	-1.015	-1.172
	(-0.310)	(-0.293)	(-0.334)
Equit/Total assets	0.002	0.003	0.005
	(0.354)	(0.411)	(0.653)
Maturity	0.022**	0.024***	0.025***
	(2.571)	(2.716)	(2.867)
Stock run-up	-0.010*	-0.009*	-0.007
	(-1.918)	(-1.863)	(-1.425)
Stock volatility	0.006	0.005	0.004
	(1.157)	(1.108)	(0.828)
Rule144a	-0.790**	-0.754**	-0.715**
	(-2.322)	(-2.187)	(-2.043)
Market volatility	-0.018	-0.013	0.023
	(-0.320)	(-0.231)	(0.393)
Market run-up	0.050*	0.050*	0.050*
	(1.764)	(1.761)	(1.696)
Nonbank		-1.496**	
		(-2.097)	
Manufacturing	-1.625***	-2.707***	-1.256***
	(-3.844)	(-3.907)	(-2.764)
Wholesaleretail	-1.319***	-2.400***	-0.990*
	(-2.706)	(-3.278)	(-1.921)
Services	-1.667***	-2.754***	-1.345***
	(-3.551)	(-3.781)	(-2.716)
Transportation	-2.710***	-3.757***	-2.255***
	(-3.218)	(-3.778)	(-2.627)
Telecommunication	-0.771	-1.839**	-0.409
	(-1.045)	(-2.016)	(-0.538)
Construction	-3.447***	-4.532***	-2.998***
	(-4.002)	(-4.476)	(-3.411)
Mining	-1.184**	-2.281***	-0.793
	(-1.985)	(-2.775)	(-1.294)
Utility	-0.729	-1.792*	-0.260
	(-0.981)	(-1.954)	(-0.340)
Constant	1.296	2.280	0.989
	(0.734)	(1.228)	(0.546)
N	2217	2217	2128
adj. R-sq	0.052	0.053	0.054

This table presents the comparison analysis of the cumulative abnormal stock returns upon convertible bond offerings across different industries. In column (1) and (2) the default is financials, whereas in column (3) we exclude all convertible bonds issued by commercial banks and hence the default is non-banks. The dependent variable is the cumulative abnormal return measured over the window (-1, 1) relative to the issue date. All explanatory variables are defined in Appendix 1.

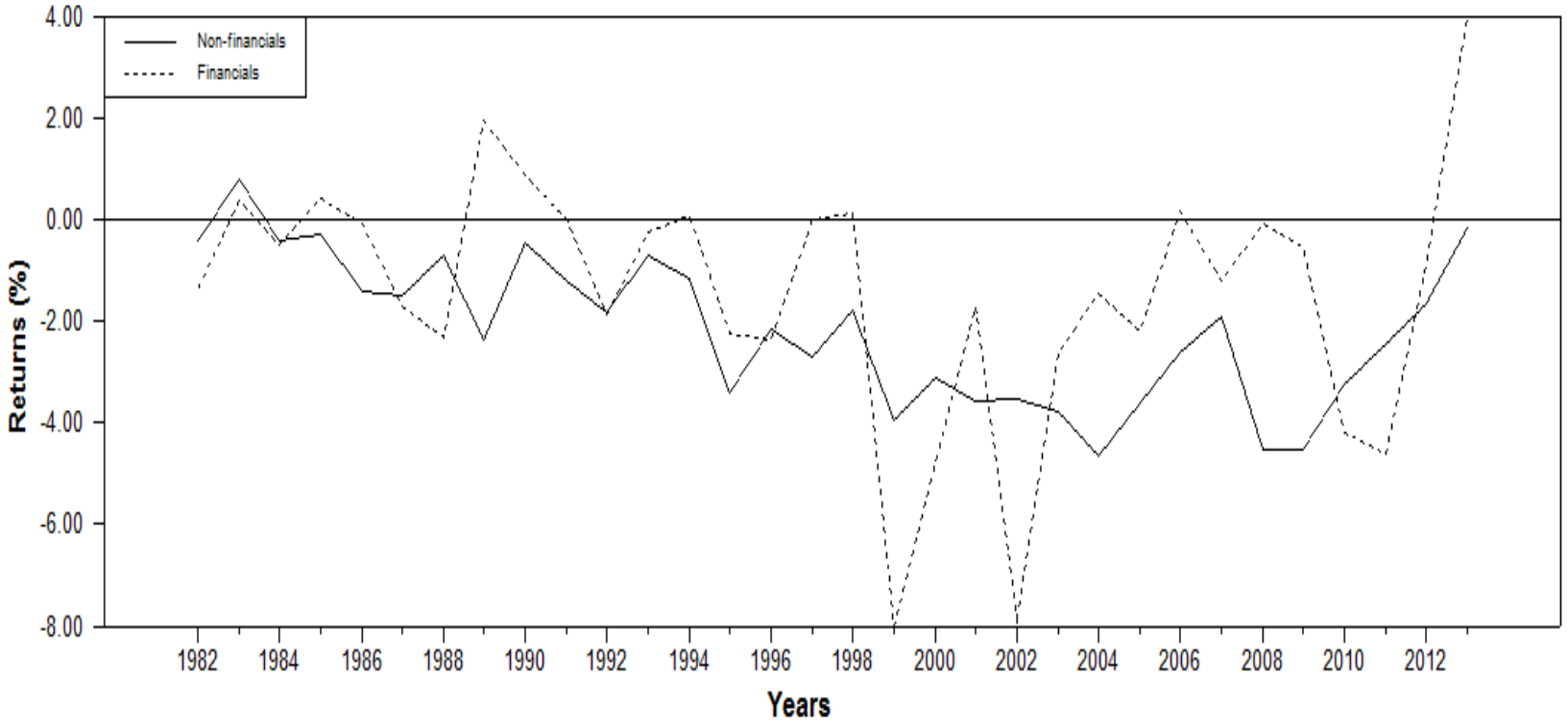
Table 5. Matched sample analysis

	Parameter estimate (t-value)
Variables	(1)
ΔEA	0.007
	(0.366)
Δstockrunup	-0.034*
	(-1.844)
Δstockvolatility	-0.012
	(-0.954)
Δmarketvolatility	-0.050
	(-1.261)
Δmarketrunup	0.192***
	(3.799)
Constant	1.138**
	(2.372)
N	317
adj. R-sq	0.058

In this table we match each financial institution with a non-financial institution based on size, relative size of proceeds and conversion premium. The dependent variable is the cumulative abnormal return of financial issued convertible bond less that of its matched non-financial institution issued convertible bond, which is measured over the window (-1, 1) relative to the announcement date. All explanatory variables are defined in Appendix 1. Constant denotes the constant term δ_0. N denotes the number of observations. *, **, and *** represent significance levels of 10%, 5% and 1%, respectively.

Figure 1 Annual covertible bond announcement returns

This figure shows the annual cumulative abnormal returns (CAR) over the (-1, 1) window upon convertible bond offerings for financials and non-financials during the sample period from 1982 to 2013.



Appendix 1. Variable definitions

Variable	Classification	Definition
Ln(total assets)	Firm-specific	Natural logarithm of total assets denominated in US dollar
Proceeds	Issue-specific	Relative size of the convertible bond offering, calculated as the offering proceeds divided by total assets
Equity/total assets	Firm-specific	Total equity divided by total assets. It is the sum of common equity, preferred stock, minority interest, long-term debt, non-equity reserves and deferred tax liability in untaxed reserves. For insurance companies policyholders' equity is also included
Maturity	Issue-specific	Convertible bond maturity, measured as of the issue date
Stock volatility	Firm-specific	Annualized stock return volatility, calculated from daily returns over the window (-250,-10) relative to the convertible bond announcement date
Stock run-up	Firm-specific	Stock return over the window (-60,-2) relative to the announcement date
Rule 144A	Issue-specific	1 for offerings made under SEC Rule 144A, and 0 otherwise
Market volatility	Market-specific	Annualized market return volatility, calculated from daily returns on the S&P 500 index over the window (-240,-40) relative to the convertible bond announcement date
Market run-up	Market-specific	Return on S&P 500 index over the window (-60,-2) relative to the announcement date
Financial		1 for financial firms, and 0 otherwise
Crisis		Dummy variable equals to 1 for convertible bond issued during year 2007 to year 2009, and 0 otherwise
Arbitrage	Issue-specific	We scale the change in monthly short interest by the number of shares outstanding measured on trading day -20 relative to the announcement date, then regress this ratio on potential determinates of convertible arbitrageur's interest in that particular convertible offering. The predicted value of this regression for each convertible bond issue is arbitrage demand
Conversion Premium	Issue-specific	Conversion premium of the convertible, expressed as a percentage. It is calculated by dividing the conversion price by the stock price measured on trading day -5, and subtracting one from this ratio
Market-to-book	Issue-specific	Market value divided by the book value of common equity
Primary capital expenditure	Firm-specific	Dummy variable equals to 1 if the issuer use the proceeds of the convertible bond for primary capital expenditure, and 0 otherwise